

In the Specification

Paragraph at page 46, lines 4 through 11:

Conventional Substituted Aniline EO Chromophores

Wherein D = donor = $-\text{NH}_2$, $-\text{N}(\text{CH}_3)_2$, $-\text{N}(\text{CH}_2\text{CH}_3)_2$, or $-\text{N}(\text{Y})_2$ where Y = alkyl alcohols, alkyl (hydrocarbon or fluorocarbon) esters, or alkyl silane derivatives;

A = acceptor = $-\text{NO}_2$, or $-\text{C}(\text{CN})\text{C}(\text{CN})_2$, and

wherein X_1 , X_2 , X_3 , X_4 are each -H.

Paragraph at page 46, lines 15 through 25:

Wherein D = donor = $-\text{NH}_2$, $-\text{N}(\text{CH}_3)_2$, $-\text{N}(\text{CH}_2\text{CH}_3)_2$, or $-\text{N}(\text{Y})_2$ where Y = alkyl alcohols, alkyl (hydrocarbon or fluorocarbon) esters, or alkyl silane derivatives;

A = acceptor = $-\text{NO}_2$, $-\text{C}(\text{CN})\text{C}(\text{CN})_2$, or $-\text{N}=\text{C}(\text{R}_1)(\text{R}_2)$ [[$-\text{N}=\text{C}(\text{R}_1)(\text{R}_2)$]], wherein $\text{R}_1 = \text{CF}_3$, C_2F_5 , $\text{C}_n\text{F}_{2n+1}$, $\text{R}_2 = \text{H}$, CH_3 , CF_3 , C_2F_5

wherein when A = $-\text{NO}_2$, or $-\text{C}(\text{CN})\text{C}(\text{CN})_2$, then X_1 , X_2 , X_3 , X_4 are each independently selected from the group -F and -H, and at least one -F is selected, and when A = $-\text{N}=\text{C}(\text{R}_1)(\text{R}_2)$ [[$-\text{N}=\text{C}(\text{R}_1)(\text{R}_2)$]], wherein $\text{R}_1 = \text{CF}_3$, C_2F_5 , $\text{C}_n\text{F}_{2n+1}$, $\text{R}_2 = \text{H}$, CH_3 , CF_3 , C_2F_5 , then X_1 , X_2 , X_3 , X_4 are each independently selected from the group -F and -H.

Paragraph at page 47, lines 5 through 25:

Wherein D = donor = $-\text{NH}_2$, $-\text{N}(\text{CH}_3)_2$, $-\text{N}(\text{CH}_2\text{CH}_3)_2$, or $-\text{N}(\text{Y})_2$ where Y = alkyl alcohols, alkyl (hydrocarbon or fluorocarbon) esters, or alkyl silane derivatives;

primary acceptor = $-\text{NO}_2$, $-\text{C}(\text{CN})\text{C}(\text{CN})_2$, or $-\text{N}=\text{C}(\text{R}_1)(\text{R}_2)$ [[$-\text{N}=\text{C}(\text{R}_1)(\text{R}_2)$]],
where $\text{R}_1 = \text{CF}_3, \text{C}_2\text{F}_5, \text{C}_n\text{F}_{2n+1}$, $\text{R}_2 = \text{H}, \text{CH}_3, \text{CF}_3, \text{C}_2\text{F}_5$

secondary acceptor = $-\text{CN}$, or $-\text{CF}_3$

wherein when [[if]] A_1 and A_2 are both primary acceptors selected from $-\text{NO}_2$, or $-\text{C}(\text{CN})\text{C}(\text{CN})_2$, then $\text{X}_1, \text{X}_2, \text{X}_3$ are each independently selected from -F and -H, but at least one -F must be selected;

wherein when [[if]] A_1 and A_2 are both secondary acceptors selected from $-\text{NO}_2$, or $-\text{C}(\text{CN})\text{C}(\text{CN})_2$, then $\text{X}_1, \text{X}_2, \text{X}_3$ are each independently selected from -F and -H, but at least one -F must be selected;

wherein when [[if]] A_1 and/or A_2 are selected from the primary acceptor $-\text{N}=\text{C}(\text{R}_1)(\text{R}_2)$ [[$-\text{N}=\text{C}(\text{R}_1)(\text{R}_2)$]], where $\text{R}_1 = \text{CF}_3, \text{C}_2\text{F}_5, \text{C}_n\text{F}_{2n+1}$, $\text{R}_2 = \text{H}, \text{CH}_3, \text{CF}_3, \text{C}_2\text{F}_5$, then $\text{X}_1, \text{X}_2, \text{X}_3$ are each independently selected from -F and -H; and

wherein when [[if]] A_1 is selected from any primary acceptor, and A_2 is selected from any secondary acceptor, then $\text{X}_1, \text{X}_2, \text{X}_3$ are each independently selected from -F and -H.

Paragraph at page 48, lines 6 through 14:

Conventional Substituted Azobenzene EO Chromophores

Wherein D = donor = $-\text{NH}_2, -\text{N}(\text{CH}_3)_2, -\text{N}(\text{CH}_2\text{CH}_3)_2$, or $-\text{N}(\text{Y})_2$ where Y = alkyl alcohols, alkyl (hydrocarbon or fluorocarbon) esters, or alkyl silane derivatives;

A = acceptor = $-\text{NO}_2$, or $-\text{C}(\text{CN})\text{C}(\text{CN})_2$, and

wherein $\text{X}_1, \text{X}_2, \text{X}_3, \text{X}_4$ are each -H.

Paragraph at page 48, line 16 through page 49, line 2:

Wherein D = donor = $-\text{NH}_2$, $-\text{N}(\text{CH}_3)_2$, $-\text{N}(\text{CH}_2\text{CH}_3)_2$, or $-\text{N}(\text{Y})_2$ where Y = alkyl alcohols, alkyl (hydrocarbon or fluorocarbon) esters, or alkyl silane derivatives;

A = acceptor = $-\text{NO}_2$, $-\text{C}(\text{CN})\text{C}(\text{CN})_2$, or $-\text{N}=\text{C}(\text{R}_1)(\text{R}_2)$ [[$-\text{N}=\text{C}(\text{R}_1)(\text{R}_2)$]], wherein $\text{R}_1 = \text{CF}_3, \text{C}_2\text{F}_5, \text{C}_n\text{F}_{2n+1}$, $\text{R}_2 = \text{H}, \text{CH}_3, \text{CF}_3, \text{C}_2\text{F}_5$

wherein when A = $-\text{NO}_2$, or $-\text{C}(\text{CN})\text{C}(\text{CN})_2$, then $\text{X}_1, \text{X}_2, \text{X}_3, \text{X}_4$ are each independently selected from the group -F and -H, and at least one -F is selected, and when A = $-\text{N}=\text{C}(\text{R}_1)(\text{R}_2)$ [[$-\text{N}=\text{C}(\text{R}_1)(\text{R}_2)$]], wherein $\text{R}_1 = \text{CF}_3, \text{C}_2\text{F}_5, \text{C}_n\text{F}_{2n+1}$, $\text{R}_2 = \text{H}, \text{CH}_3, \text{CF}_3, \text{C}_2\text{F}_5$, then $\text{X}_1, \text{X}_2, \text{X}_3, \text{X}_4$ are each independently selected from the group -F and -H.

Paragraph at page 49, lines 9 through 29:

Wherein D = donor = $-\text{NH}_2$, $-\text{N}(\text{CH}_3)_2$, $-\text{N}(\text{CH}_2\text{CH}_3)_2$, or $-\text{N}(\text{Y})_2$ where Y = alkyl alcohols, alkyl (hydrocarbon or fluorocarbon) esters, or alkyl silane derivatives;

primary acceptor = $-\text{NO}_2$, $-\text{C}(\text{CN})\text{C}(\text{CN})_2$, or $-\text{N}=\text{C}(\text{R}_1)(\text{R}_2)$ [[$-\text{N}=\text{C}(\text{R}_1)(\text{R}_2)$]], where $\text{R}_1 = \text{CF}_3, \text{C}_2\text{F}_5, \text{C}_n\text{F}_{2n+1}$, $\text{R}_2 = \text{H}, \text{CH}_3, \text{CF}_3, \text{C}_2\text{F}_5$

secondary acceptor = $-\text{CN}$, or $-\text{CF}_3$

wherein when [[if]] A_1 and A_2 are both primary acceptors selected from $-\text{NO}_2$, or $-\text{C}(\text{CN})\text{C}(\text{CN})_2$, then $\text{X}_1, \text{X}_2, \text{X}_3$ are each independently selected from -F and -H, but at least one -F must be selected;

wherein when [[if]] A_1 and A_2 are both secondary acceptors selected from $-\text{NO}_2$, or $-\text{C}(\text{CN})\text{C}(\text{CN})_2$, then $\text{X}_1, \text{X}_2, \text{X}_3$ are each independently selected from -F and -H, but at least one -F must be selected;

wherein when [[if]] A_1 and/or A_2 are selected from the primary acceptor $-\text{N}=\text{C}(\text{R}_1)(\text{R}_2)$ [[$-\text{N}=\text{C}(\text{R}_1)(\text{R}_2)$]], where $\text{R}_1 = \text{CF}_3, \text{C}_2\text{F}_5, \text{C}_n\text{F}_{2n+1}$, $\text{R}_2 = \text{H}, \text{CH}_3, \text{CF}_3, \text{C}_2\text{F}_5$, then $\text{X}_1, \text{X}_2, \text{X}_3$ are each independently selected from -F and -H; and

wherein when [[if]] A_1 is selected from any primary acceptor, and A_2 is selected from any secondary acceptor, then X_1 , X_2 , X_3 are each independently selected from -F and -H.

Paragraph at page 50, lines 5 through 12:

Conventional Substituted Stilbene EO Chromophores

Wherein D = donor = $-\text{NH}_2$, $-\text{N}(\text{CH}_3)_2$, $-\text{N}(\text{CH}_2\text{CH}_3)_2$, or $-\text{N}(\text{Y})_2$ where Y = alkyl alcohols, alkyl (hydrocarbon or fluorocarbon) esters, or alkyl silane derivatives;

A = acceptor = $-\text{NO}_2$, or $-\text{C}(\text{CN})\text{C}(\text{CN})_2$, and

wherein X_1 , X_2 , X_3 , X_4 are each -H.

Paragraph at page 50, lines 16 through 26:

Wherein D = donor = $-\text{NH}_2$, $-\text{N}(\text{CH}_3)_2$, $-\text{N}(\text{CH}_2\text{CH}_3)_2$, or $-\text{N}(\text{Y})_2$ where Y = alkyl alcohols, alkyl (hydrocarbon or fluorocarbon) esters, or alkyl silane derivatives;

A = acceptor = $-\text{NO}_2$, $-\text{C}(\text{CN})\text{C}(\text{CN})_2$, or $-\text{N}=\text{C}(\text{R}_1)(\text{R}_2)$ [[$-\text{N}=\text{C}(\text{R}_1)(\text{R}_2)$]], wherein $\text{R}_1 = \text{CF}_3$, C_2F_5 , $\text{C}_n\text{F}_{2n+1}$, $\text{R}_2 = \text{H}$, CH_3 , CF_3 , C_2F_5

wherein when A = $-\text{NO}_2$, or $-\text{C}(\text{CN})\text{C}(\text{CN})_2$, then X_1 , X_2 , X_3 , X_4 are each independently selected from the group -F and -H, and at least one -F is selected, and when A = $-\text{N}=\text{C}(\text{R}_1)(\text{R}_2)$ [[$-\text{N}=\text{C}(\text{R}_1)(\text{R}_2)$]], wherein $\text{R}_1 = \text{CF}_3$, C_2F_5 , $\text{C}_n\text{F}_{2n+1}$, $\text{R}_2 = \text{H}$, CH_3 , CF_3 , C_2F_5 , then X_1 , X_2 , X_3 , X_4 are each independently selected from the group -F and -H.

Paragraph at page 51, line 6 through line 26:

Wherein D = donor = $-\text{NH}_2$, $-\text{N}(\text{CH}_3)_2$, $-\text{N}(\text{CH}_2\text{CH}_3)_2$, or $-\text{N}(\text{Y})_2$ where Y = alkyl alcohols, alkyl (hydrocarbon or fluorocarbon) esters, or alkyl silane derivatives;

primary acceptor = $-\text{NO}_2$, $-\text{C}(\text{CN})\text{C}(\text{CN})_2$, or $-\text{N}=\text{C}(\text{R}_1)(\text{R}_2)$ [[$-\text{N}=\text{C}(\text{R}_1)(\text{R}_2)$]], where $\text{R}_1 = \text{CF}_3, \text{C}_2\text{F}_5, \text{C}_n\text{F}_{2n+1}$, $\text{R}_2 = \text{H}, \text{CH}_3, \text{CF}_3, \text{C}_2\text{F}_5$

secondary acceptor = $-\text{CN}$, or $-\text{CF}_3$

wherein when [[if]] A_1 and A_2 are both primary acceptors selected from $-\text{NO}_2$, or $-\text{C}(\text{CN})\text{C}(\text{CN})_2$, then $\text{X}_1, \text{X}_2, \text{X}_3$ are each independently selected from -F and -H, but at least one -F must be selected;

wherein when [[if]] A_1 and A_2 are both secondary acceptors selected from $-\text{NO}_2$, or $-\text{C}(\text{CN})\text{C}(\text{CN})_2$, then $\text{X}_1, \text{X}_2, \text{X}_3$ are each independently selected from -F and -H, but at least one -F must be selected;

wherein when [[if]] A_1 and/or A_2 are selected from the primary acceptor $-\text{N}=\text{C}(\text{R}_1)(\text{R}_2)$ [[$-\text{N}=\text{C}(\text{R}_1)(\text{R}_2)$]], where $\text{R}_1 = \text{CF}_3, \text{C}_2\text{F}_5, \text{C}_n\text{F}_{2n+1}$, $\text{R}_2 = \text{H}, \text{CH}_3, \text{CF}_3, \text{C}_2\text{F}_5$, then $\text{X}_1, \text{X}_2, \text{X}_3$ are each independently selected from -F and -H; and

wherein when [[if]] A_1 is selected from any primary acceptor, and A_2 is selected from any secondary acceptor, then $\text{X}_1, \text{X}_2, \text{X}_3$ are each independently selected from -F and -H.

Paragraph at page 52, lines 4 through 11:

Conventional Substituted Imine EO Chromophores

Wherein D = donor = $-\text{NH}_2$, $-\text{N}(\text{CH}_3)_2$, $-\text{N}(\text{CH}_2\text{CH}_3)_2$, or $-\text{N}(\text{Y})_2$ where Y = alkyl alcohols, alkyl (hydrocarbon or fluorocarbon) esters, or alkyl silane derivatives;

A = acceptor = $-\text{NO}_2$, or $-\text{C}(\text{CN})\text{C}(\text{CN})_2$, and

wherein $\text{X}_1, \text{X}_2, \text{X}_3, \text{X}_4$ are each -H.

Paragraph at page 53, lines 1 through 11:

Wherein D = donor = $-\text{NH}_2$, $-\text{N}(\text{CH}_3)_2$, $-\text{N}(\text{CH}_2\text{CH}_3)_2$, or $-\text{N}(\text{Y})_2$ where Y = alkyl alcohols, alkyl (hydrocarbon or fluorocarbon) esters, or alkyl silane derivatives;

A = acceptor = $-\text{NO}_2$, $-\text{C}(\text{CN})\text{C}(\text{CN})_2$, or $-\text{N}=\text{C}(\text{R}_1)(\text{R}_2)$ [[$-\text{N}=\text{C}(\text{R}_1)(\text{R}_2)$]], wherein $\text{R}_1 = \text{CF}_3, \text{C}_2\text{F}_5, \text{C}_n\text{F}_{2n+1}$, $\text{R}_2 = \text{H}, \text{CH}_3, \text{CF}_3, \text{C}_2\text{F}_5$

wherein when A = $-\text{NO}_2$, or $-\text{C}(\text{CN})\text{C}(\text{CN})_2$, then $\text{X}_1, \text{X}_2, \text{X}_3, \text{X}_4$ are each independently selected from the group -F and -H, and at least one -F is selected, and when A = $-\text{N}=\text{C}(\text{R}_1)(\text{R}_2)$ [[$-\text{N}=\text{C}(\text{R}_1)(\text{R}_2)$]], wherein $\text{R}_1 = \text{CF}_3, \text{C}_2\text{F}_5, \text{C}_n\text{F}_{2n+1}$, $\text{R}_2 = \text{H}, \text{CH}_3, \text{CF}_3, \text{C}_2\text{F}_5$, then $\text{X}_1, \text{X}_2, \text{X}_3, \text{X}_4$ are each independently selected from the group -F and -H.

Paragraph at page 53, line 19 through page 54, line 15:

Wherein D = donor = $-\text{NH}_2$, $-\text{N}(\text{CH}_3)_2$, $-\text{N}(\text{CH}_2\text{CH}_3)_2$, or $-\text{N}(\text{Y})_2$ where Y = alkyl alcohols, alkyl (hydrocarbon or fluorocarbon) esters, or alkyl silane derivatives;

primary acceptor = $-\text{NO}_2$, $-\text{C}(\text{CN})\text{C}(\text{CN})_2$, or $-\text{N}=\text{C}(\text{R}_1)(\text{R}_2)$ [[$-\text{N}=\text{C}(\text{R}_1)(\text{R}_2)$]], where $\text{R}_1 = \text{CF}_3, \text{C}_2\text{F}_5, \text{C}_n\text{F}_{2n+1}$, $\text{R}_2 = \text{H}, \text{CH}_3, \text{CF}_3, \text{C}_2\text{F}_5$

secondary acceptor = $-\text{CN}$, or $-\text{CF}_3$

wherein when [[if]] A_1 and A_2 are both primary acceptors selected from $-\text{NO}_2$, or $-\text{C}(\text{CN})\text{C}(\text{CN})_2$, then $\text{X}_1, \text{X}_2, \text{X}_3$ are each independently selected from -F and -H, but at least one -F must be selected;

wherein when [[if]] A_1 and A_2 are both secondary acceptors selected from $-\text{NO}_2$, or $-\text{C}(\text{CN})\text{C}(\text{CN})_2$, then $\text{X}_1, \text{X}_2, \text{X}_3$ are each independently selected from -F and -H, but at

least one -F must be selected;

wherein when [[if]] A_1 and/or A_2 are selected from the primary acceptor $\underline{-N=C(R_1)(R_2)}$ [[$-N=C(R_1)(R_2)$]], where $R_1 = CF_3, C_2F_5, C_nF_{2n+1}$, $R_2 = H, CH_3, CF_3, C_2F_5$, then X_1, X_2, X_3 are each independently selected from -F and -H; and

wherein when [[if]] A_1 is selected from any primary acceptor, and A_2 is selected from any secondary acceptor, then X_1, X_2, X_3 are each independently selected from -F and -H.

Paragraph at page 56, lines 1-3:

Primary = $-NO_2, -C(CN)C(CN)_2, \underline{-N=C(R_1)(R_2)}$ [[$-N=C(R_1)(R_2)$]], where $R_1 = CF_3, C_2F_5, C_nF_{2n+1}$, $R_2 = H, CH_3, CF_3, C_2F_5$

Secondary = $-CN, -CF_3$

Paragraph at page 57, lines 7-11:

$S = \text{spacer} = -CH=CH-, -N=CH-, -CH=N-, -N=N-$
(stilbene) (imine) (imine) (azo)

Primary = $-NO_2, -C(CN)C(CN)_2, \underline{-N=C(R_1)(R_2)}$ [[$-N=C(R_1)(R_2)$]], where $R_1 = CF_3, C_2F_5, C_nF_{2n+1}$, $R_2 = H, CH_3, CF_3, C_2F_5$

Secondary = $-CN, -CF_3$

Paragraph at page 59, lines 2 through 6:

$S = \text{spacer} = -CH=CH-, -N=CH-, -CH=N-, -N=N-$
(stilbene) (imine) (imine) (azo)

Primary = $-NO_2, -C(CN)C(CN)_2, \underline{-N=C(R_1)(R_2)}$ [[$-N=C(R_1)(R_2)$]], where $R_1 = CF_3, C_2F_5, C_nF_{2n+1}$, $R_2 = H, CH_3, CF_3, C_2F_5$

Secondary = $-CN, -CF_3$

Paragraph at page 79, lines 1-11:

Referring again to the Drawing, the modified fiber 100 was placed in a test apparatus 150, in order to measure the thermo-optical properties of the functional optical material 105 of this invention. Test apparatus 150 consisted of a heating block 152 that held the modified fiber 100. The heating block was made up of an electrical heating coil (not shown) and connected to a source of electrical power 154. A thermocouple 160 was mounted to the functional optical material 105 to allow temperature measurements. The thermocouple 160 was connected to a display unit 162 for amplification of the signal and display. A light source 170 was used to send a light 172 into one end of the modified fiber 100 and a light detector 174 for detected light 176 that had passed through the modified fiber 100.